

Complete Summary

GUIDELINE TITLE

Guidelines for the diagnosis and management of blunt aortic injury.

BIBLIOGRAPHIC SOURCE(S)

Guidelines for the diagnosis and management of blunt aortic injury. Allentown (PA): Eastern Association for the Surgery of Trauma (EAST); 2000. 20 p. [155 references]

Nagy K, Fabian T, Rodman G, Fulda G, Rodriguez A, Mirvis S. Guidelines for the diagnosis and management of blunt aortic injury: an EAST Practice Management Guidelines Work Group. J Trauma 2000 Jun; 48(6): 1128-43. [144 references]

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 INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT
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SCOPE

DISEASE/CONDITION(S)

Blunt aortic injury

GUIDELINE CATEGORY

Diagnosis
 Management
 Treatment

CLINICAL SPECIALTY

Cardiology
 Emergency Medicine
 Internal Medicine
 Radiology

Surgery
Thoracic Surgery

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

To present recommendations regarding the best method of diagnosis and treatment of blunt aortic injury.

TARGET POPULATION

Individuals with blunt aortic injuries

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnosis and Screening

1. Chest x-ray
2. Angiography
3. Computed tomography of the chest, including helical and spiral scanners
4. Transesophageal echocardiography

Management

1. Surgical repair of the aorta, including direct suture repair (clamp/sew) and placement of prosthetic graft (bypass surgery)
2. Distal perfusion (e.g., heparin-bonded [Gott] shunts; partial or full cardiac bypass with and without systemic heparinization)
3. Medical control of blood pressure (e.g., beta-blockers, nitroprusside)

MAJOR OUTCOMES CONSIDERED

- Accurate diagnosis of blunt aortic injury
- Morbidity and mortality related to blunt aortic injury or complications of surgery

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

A MEDLINE search was performed for the years 1966 through 1997. All English language citations with the subject words "thoracic aorta" and "wounds, nonpenetrating" were retrieved. Letters to the editor, isolated case reports, animal studies, meta-analyses and review articles were deleted from further review. The bibliography sections of review articles and meta-analyses were used, however, to identify additional references not retrieved with the MEDLINE search. This process resulted in 137 articles, which were reviewed by a group consisting of trauma surgeons, thoracic surgeons and a trauma radiologist.

NUMBER OF SOURCE DOCUMENTS

137 source documents

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Evidence Classification Scheme:

Class I: Prospective, Randomized, Double-Blinded Study

Class II: Prospective, Randomized, Non-Blinded Trial

Class III: Retrospective Analysis of Patient Series

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not applicable

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The articles retrieved by the literature search were reviewed by a group consisting of trauma surgeons, thoracic surgeons and a trauma radiologist. This group collaborated to produce the recommendations and the evidentiary table.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Level I: This recommendation is convincingly justifiable based on the available scientific information alone. It is usually based on Class I data, however, strong Class II evidence may form the basis for a level 1 recommendation, especially if the issue does not lend itself to testing in a randomized format. Conversely, weak or contradictory Class I data may not be able to support a level 1 recommendation.

Level II: This recommendation is reasonably justifiable by available scientific evidence and strongly supported by expert critical care opinion. It is usually supported by Class II data or a preponderance of Class III evidence.

Level III: The recommendation is supported by available data but adequate scientific evidence is lacking. This recommendation is generally supported by Class III data. This type of recommendation is useful for educational purposes and in guiding future clinical research.

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The draft document is submitted to all members of the panel for review and modification. Subsequently the guidelines are forwarded to the chairmen of the Eastern Association of Trauma ad hoc committee for guideline development. Final modifications are made and the document is forwarded back to the individual panel chairpersons.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Level I-III recommendations, and the class of data grading (I-III) are defined at the end of the "Major Recommendations" field.

Blunt aortic injury is a lethal result of severe blunt trauma. It should be considered in all patients with a deceleration or acceleration mechanism, especially in the face of physical or radiographic findings suggestive of mediastinal injury. Angiography remains the "gold standard" for diagnosis, although computed tomography scanning is taking more of a role, especially for screening. Diagnosis should be followed by prompt surgical repair using some method of distal perfusion to minimize renal and spinal cord ischemia. If prompt repair is not feasible because of other injuries or comorbidities, medical control of blood pressure is warranted in the interim.

The level of the following recommendations corresponds roughly to the class of references which support it.

A. Level I

There is insufficient evidence to support a standard of care on this topic.

B. Level II

1. The possibility of a blunt aortic injury should be considered in all patients who are involved in a motor vehicle collision, regardless of the direction of impact.
2. The chest x-ray is a good screening tool for determining the need for further investigation. The most significant chest x-ray findings include (but are not limited to): widened mediastinum, obscured aortic knob, deviation of the left mainstem bronchus or nasogastric tube, and opacification of the aortopulmonary window.
3. Angiography is a very sensitive, specific and accurate test for the presence of blunt aortic injury. It is the standard by which most other diagnostic tests are compared.
4. Computed tomography of the chest is a useful diagnostic tool for both screening and diagnosis of blunt aortic injury. Spiral or helical computed tomography scanners have an extremely high negative predictive value and may be used alone to rule out blunt aortic injury. When these scanners are used, angiography may be reserved for patients with indeterminate scans.
5. Prompt repair of the blunt aortic injury is preferred. If the patient has more immediately life-threatening injuries that require intervention such as emergent laparotomy or craniotomy, or if the patient is a poor operative candidate due to age or comorbidities, the aortic repair may be delayed. Medical control of blood pressure is advised until surgical repair can be accomplished.

C. Level III

1. The presence of physical findings such as pseudocoarctation or intrascapular murmur should be investigated further.
2. Transesophageal echocardiography is also a sensitive and specific test. There are several limitations to this test. It does require training and expertise that may not be as readily available as angiography.
3. Repair of the aortic injury is best accomplished with some method of distal perfusion, either bypass or shunt. Neurologic complications appear to correlate with ischemia time; therefore, this time should be kept to a minimum.

Definitions:

Recommendation Scheme:

Level I: This recommendation is convincingly justifiable based on the available scientific information alone. It is usually based on Class I data, however, strong Class II evidence may form the basis for a level 1 recommendation, especially if the issue does not lend itself to testing in a randomized format. Conversely, weak or contradictory Class I data may not be able to support a level 1 recommendation.

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Level III: The recommendation is supported by available data but adequate scientific evidence is lacking. This recommendation is generally supported by Class III data. This type of recommendation is useful for educational purposes and in guiding future clinical research.

Classification Scheme:

Class I: Prospective, Randomized, Double-Blinded Study

Class II: Prospective, Randomized, Non-Blinded Trial

Class III: Retrospective Analysis of Patient Series

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

Conclusions were based on evidence obtained from prospective, noncomparative clinical studies or retrospective analyses based on reliable data (Class II evidence), or retrospective case series or database review (Class III evidence). There were no Class I articles reviewed.

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- More accurate and earlier diagnosis of blunt aortic injury
- Decreased morbidity and mortality due to blunt aortic injury

POTENTIAL HARMS

- A potential problem with the computed tomography of the chest is that it may delay the time to angiography, and thus to a definitive diagnosis. This problem is resolved with newer generation scanners such as helical or spiral computed tomography scanners. They are more sensitive, and appear to have 100% negative predictive value.
- Transesophageal echocardiography does not visualize the ascending aorta or the aortic branches well and may miss injuries to these vessels.

- The most feared complications of blunt aortic injury repair are paraplegia and renal failure, both of which result from ischemia during the repair. Ischemic complications correlate with the time the aorta is clamped. In addition, there are more metabolic derangements resulting from reperfusion when the clamp and sew method is employed.
- There is a theoretical risk of increased bleeding from head or abdominal injuries with systemic heparinization.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

The guideline developers make the following recommendations regarding implementation:

Implementation involves extensive education and inservicing of nursing, resident, and attending staff members and has one important guiding principle: the guidelines must be available to the clinicians in real time while they are actually seeing the patient. The two most common ways to apply these are by using either a critical pathway or a clinical management protocol. A critical pathway is a calendar of expected events that has been found to be very useful within designated diagnosis-related groups. In trauma, where there are multiple diagnosis-related groups used for one patient, pathways have not been found to be easily applied with the exception of isolated injuries. Clinical management protocols, on the other hand, are annotated algorithms that answer the "if, then" decision making problems and have been found to be easily applied to problem-, process-, or disease-related topics. The clinical management protocol consists of an introduction, an annotated algorithm and a reference page. The algorithm is a series of "if, then" decision making processes. There is a defined entry point followed by a clinical judgment and/or assessment, followed by actions, which are then followed by outcomes and/or endpoints. The advantages of algorithms are that they convey the scope of the guideline, while at the same time organize the decision making process in a user-friendly fashion. The algorithms themselves are systems of classification and identification that should summarize the recommendations contained within a guideline. It is felt that in the trauma and critical care setting, Clinical management protocols may be more easily applied than critical pathways, however, either is acceptable provided that the formulated guidelines are followed. After appropriate inservicing, a pretest of the planned guideline should be performed on a limited patient population in the clinical setting. This will serve to identify potential pitfalls. The pretest should include written documentation of experiences with the protocol, observation, and suggestions. Additionally, the guidelines will be forwarded to the chairpersons of the multi-institutional trials committees of the Eastern Association for the Surgery of Trauma, the Western Association for the Surgery of Trauma, and the American Association for the Surgery of Trauma. Appropriate guidelines can then be potentially selected for multi-institutional study. This process will facilitate the development of user friendly pathways or protocols as well as evaluation of the particular guidelines in an outcome based fashion.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness
Timeliness

IDENTIFYING INFORMATION AND AVAILABILITY

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ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2000

GUIDELINE DEVELOPER(S)

Eastern Association for the Surgery of Trauma - Professional Association

SOURCE(S) OF FUNDING

Eastern Association for the Surgery of Trauma (EAST)

GUIDELINE COMMITTEE

EAST Practice Management Guidelines Work Group

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Workgroup Members: Kimberly Nagy, MD; Timothy Fabian, MD; George Rodman, MD; Gerard Fulda, MD; Aurelio Rodriguez, MD; Stuart Mirvis, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

An update is not in progress at this time.

GUIDELINE AVAILABILITY

Electronic copies: Available (in Portable Document Format [PDF] format) from the [Eastern Association for the Surgery of Trauma \(EAST\) Web site](#).

Print copies: Available from the EAST Guidelines, c/o Fred A. Luchette, MD, Loyola University Medical Center, Department of Surgery Bldg. 110-3276, 2160 S. First Avenue, Maywood, IL 60153; Phone: (708) 327-2680; E-mail: fluchet@lumc.edu.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- Practice Management Guidelines for Trauma: East Ad Hoc Committee on Guideline Development (Unabridged: Revised 1998 Mar 20). Available from the [Eastern Association for the Surgery of Trauma \(EAST\) Web site](#).

An excerpt is also available:

- Pasquale M, Fabian TC. Practice management guidelines for trauma from the Eastern Association for the Surgery of Trauma. J Trauma 1998 Jun;44(6):941-56; discussion 956-7.

Also available:

- Utilizing evidence based outcome measures to develop practice management guidelines: a primer. Allentown (PA): Eastern Association for the Surgery of Trauma; 2000. 18 p. Available from the [EAST Web site](#).

Print copies: Available from the EAST Guidelines, c/o Fred A. Luchette, MD, Loyola University Medical Center, Department of Surgery Bldg. 110-3276, 2160 S. First Avenue, Maywood, IL 60153; Phone: (708) 327-2680; E-mail: fluchet@lumc.edu.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on March 9, 2001. The information was verified by the guideline developer on May 4, 2001.

COPYRIGHT STATEMENT

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